

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Canceled) A method for coating a printed circuit board comprising an insulating layer and a conducting layer, with metal pads and/or through-holes in which the pads and/or through-holes are provided with an anti-tarnish coating, the method comprising contacting the pads and/or through-holes with a bright-etch composition in a bright-etch step; and

subsequently metal plating the etched pads and/or through-holes by contact with a plating composition comprising ions of a metal which is more electropositive than the metal from which the pads and/or through-holes are formed and being substantially free of reducing agent for said ions in an immersion metal plating step to form solderable plated metal surfaces.

2. (Canceled) A method according to claim 1 in which the plated metal surfaces are contacted with a solution of a tarnish inhibitor.

3. (Canceled) A method for coating a printed circuit board comprising an insulating layer and a conducting layer, with metal pads and/or through-holes in which the pads and/or through-holes are provided with an anti-tarnish coating, the method comprising metal plating the etched pads and/or through-holes by contact with a plating composition in a metal plating step to form solderable

plated metal surfaces and contacting the plated metal surfaces with a solution of tarnish inhibitor.

4. (Canceled) A method according to claim 1 in which the metal plating step is a method in which a metal which is more electropositive than the metal of the said pads and/or through-holes is immersion/displacement coated from an aqueous solution containing ions of the more electropositive metal substantially free of reducing agent for said ions.

5. (Canceled) A method according to claim 1 in which the plating composition contains a complexing agent for the said ions, preferably a multidentate ligand complexing agent.

6. (Canceled) A method according to claim 1 or claim 3 in which the plating composition comprises a tarnish inhibitor and in the process, the metal surfaces are contacted with a solution comprising a tarnish inhibitor during the plating step, so that the tarnish inhibitor is present in the metal plating composition.

7. (Canceled) A method according to claim 1 or claim 3 in which the metal plated surfaces are formed in the plating step and subsequently the pre-formed plated metal surfaces are contacted with a solution comprising a tarnish inhibitor in a postrinse second step.

8. (Canceled) A method according to claim 2 or claim 3 in which the contact time of the plated metal surfaces with

the solution comprising a tarnish inhibitor is from 10 seconds to 5 minutes.

9. (Canceled) A method according to claim 2 or claim 3 in which the metal surfaces are contacted with a solution comprising a tarnish inhibitor by dip coating or spray coating.

10. (Canceled) A method according to claim 2 or claim 3 in which the tarnish inhibitor is present in the solution in an amount of from 0.001 to 5% by weight of the solution.

11. (Canceled) A method according to claim 1 in which the metal coating of the plated metal surfaces comprise nickel, silver, tin, lead, palladium, cobalt, gold, platinum or bismuth or their alloys, preferably silver.

12. (Canceled) A method according to claim 1 in which the pads or through-holes are formed of copper.

13. (Canceled) A method according to claim 1 including a preliminary step of applying to exposed conductor traces at the surface of the PCB a mask which is an insulator, such that the pads and/or through-holes are left exposed.

14. (Canceled) A method according to claim 1 including a subsequent step of attaching conducting components to the metal plated pads and/or through-holes using solder in direct contact with the metal plating.

15. (Canceled) An aqueous plating composition suitable for forming an immersion plating of a relatively more

electropositive metal on a relatively less electropositive metal substrate containing ions of the more electropositive metal and a complexing agent for the ions and a tarnish inhibitor for the more electropositive metal and being substantially free of reducing agent for said ions.

16. (Canceled) A composition according to claim 15 in which the tarnish inhibitor is present in the solution in an amount of from 0.001 to 5% by weight of the composition.

17. (Canceled) A composition according to claim 15 in which the said ions are of nickel, silver, tin, lead, palladium, cobalt, gold, platinum or bismuth or their alloys, preferably silver.

18. (Previously presented) A process for improving the solderability of a metal surface, said process comprising treating the metal surface with an immersion silver plating solution, said solution comprising:

- a). a soluble source of silver ions;
- b). an acid;
- c). an additive selected from the group consisting of fatty amines, fatty amides, quaternary salts, and ethoxylated versions of any of the foregoing.

19. (Previously presented) A process according to claim 18 wherein the silver plating solution also comprises material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives and benzimidazole derivatives.

20. (Canceled) A process according to claim 18 wherein the silver plating solution also comprises an oxidant.

21. (Previously presented) A process according to claim 18 wherein the metal surface comprises copper.

22. (Previously presented) A process according to claim 21 wherein the silver plating solution also comprises a material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives, and benzimidazole derivatives.

23. (Canceled) A process according to claim 22 wherein the silver plating solution also comprises an oxidant.

24. (Previously presented) An immersion silver plating solution comprising

- (i) a soluble source of silver ions,
- (ii) an acid and
- (iii) an additive selected from the group consisting of fatty amines, fatty amides, quaternary salts, and ethoxylated versions of any of the foregoing.

25. (Previously presented) An immersion plating solution according to claim 24 also comprising a material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives, and benzimidazole derivatives.

26. (Canceled) An immersion plating solution according to claim 24 also comprising an oxidant.

27. (Canceled) A process for improving the solderability of a metal surface, said process comprising treating the metal surface with an immersion silver plating solution, said solution comprising:

- a). a soluble source of silver ions;
- b). an acid; and
- c). an additive that substantially prevents silver migration by providing a barrier to moisture.

28. (Canceled) A process for improving the solderability of a metal surface, said process comprising:

- a). contacting the metal surface with an immersion silver plating solution thereby producing an immersion silver plate upon the metal surface; and
- b). treating the immersion silver plated metal surface with a solution comprising an additive that substantially prevents silver migration by providing a barrier to moisture.

29. (Canceled) A process according to claim 28, wherein the solution described in step (b) is distinct from the immersion plating solution of step (a), and step (b) is performed after step (a).

30. (Canceled) A process according to claim 28, wherein the additive is a component of the immersion silver plating solution.

31. (Canceled) An immersion silver plating solution comprising (i) a soluble source of silver ions, (ii) an

acid and (iii) an additive that substantially prevents silver migration by providing a barrier to moisture.

32. (Previously presented) A process for improving the solderability of a metal surface, said process comprising:

a). contacting the metal surface with an immersion silver plating solution thereby producing an immersion silver plate upon the metal surface; and thereafter

b). treating the immersion silver plated metal surface with a solution comprising an additive selected from the group consisting of fatty amines, fatty amides, quaternary salts, and ethoxylated versions of any of the foregoing.

33. (Previously presented) A process according to claim 32 wherein the silver plating solution comprises a material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives and benzimidazole derivatives.

34. (Canceled) A process according to claim 32 wherein the silver plating solution also comprises an oxidant.

35. (Previously presented) A process according to claim 32 wherein the metal surface comprises copper.

36. (Previously presented) A process according to claim 35 wherein the silver plating solution comprises a material selected from the group consisting of imidazoles,

benzimidazoles, imidazole derivatives and benzimidazole derivatives.

37. (Canceled) A process according to claim 36 wherein the silver plating solution also comprises an oxidant.

38. (Canceled) An immersion silver plating solution comprising an additive selected from the group consisting of fatty amines, fatty amides, quaternary salts, and ethoxylated versions of any of the foregoing.

39. (Canceled) An immersion plating solution according to claim 38 also comprising a material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives, and benzimidazole derivatives.

40. (Canceled) An immersion plating solution according to claim 38 also comprising an oxidant.

41. (New) A printed circuit board having metal pads, metal through holes or combination thereof, the metal pads, metal through-holes or combination thereof being formed of copper and comprising an immersion silver plate thereon, the surface of said silver plate having been treated with a solution comprising an additive selected from the group consisting of fatty amines, fatty amides, quaternary salts, and ethoxylated versions of any of the foregoing.

42. (New) The printed circuit board as set forth in claim 41 comprising components attached to silver plated copper metal pads and/or through holes thereof.



43. (New) The printed circuit board as set forth in claim 42, said components having been attached subsequent to treating of said silver plated copper metal pads with said solution comprising said additive.

44. (New) The printed circuit board as set forth in claim 42 wherein said component(s) are selected from the group consisting of resistors and transistors.

45. (New) The printed circuit board as set forth in claim 43 wherein said component(s) are selected from the group consisting of resistors and transistors.

46. (New) The printed circuit board as set forth in claim 41 comprising a bare board.

47. (New) The printed circuit board as set forth in claim 41 wherein said silver plate has been deposited from a silver immersion plating solution comprising a material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives, and benzimidazole derivatives.

48. (New) The printed circuit board as set forth in claim 42 wherein said silver plate has been deposited from a silver immersion plating solution comprising a material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives, and benzimidazole derivatives.

49. (New) The printed circuit board as set forth in claim 43 wherein said silver plate has been deposited from a silver immersion plating solution comprising a material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives, and benzimidazole derivatives.

50. (New) The printed circuit board as set forth in claim 44 wherein said silver plate has been deposited from a silver immersion plating solution comprising a material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives, and benzimidazole derivatives.

51. (New) The printed circuit board as set forth in claim 45 wherein said silver plate has been deposited from a silver immersion plating solution comprising a material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives, and benzimidazole derivatives.

52. (New) The printed circuit board as set forth in claim 46 wherein said silver plate has been deposited from a silver immersion plating solution comprising a material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives, and benzimidazole derivatives.

53. (New) A printed circuit board having metal pads, metal through holes or combination thereof, the metal pads, metal through-holes or combination thereof being formed of copper and comprising an immersion silver plate thereon,

the silver plate having been formed by a process comprising treating the metal surface with an immersion silver plating solution comprising a soluble source of silver ions, and acid, and an additive selected from the group consisting of fatty amines, fatty amides, quaternary salts, and ethoxylated versions of any of the foregoing.

54. (New) The printed circuit board as set forth in claim 53 comprising components attached to silver plated copper metal pads and/or through holes thereof.

55. (New) The printed circuit board as set forth in claim 54, said components having been attached subsequent to immersing said copper metal pads in said plating solution comprising said additive.

56. (New) The printed circuit board as set forth in claim 54 wherein said component(s) are selected from the group consisting of resistors and transistors.

57. (New) The printed circuit board as set forth in claim 55 wherein said component(s) are selected from the group consisting of resistors and transistors.

58. (New) The printed circuit board as set forth in claim 53 comprising a bare board.

59. (New) The printed circuit board as set forth in claim 53 wherein said silver plate has been deposited from a silver immersion plating solution comprising a material selected from the group consisting of imidazoles,

benzimidazoles, imidazole derivatives, and benzimidazole derivatives.

60. (New) The printed circuit board as set forth in claim 54 wherein said silver plate has been deposited from a silver immersion plating solution comprising a material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives, and benzimidazole derivatives.

61. (New) The printed circuit board as set forth in claim 55 wherein said silver plate has been deposited from a silver immersion plating solution comprising a material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives, and benzimidazole derivatives.

62. (New) The printed circuit board as set forth in claim 56 wherein said silver plate has been deposited from a silver immersion plating solution comprising a material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives, and benzimidazole derivatives.

63. (New) The printed circuit board as set forth in claim 57 wherein said silver plate has been deposited from a silver immersion plating solution comprising a material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives, and benzimidazole derivatives.

64. (New) The printed circuit board as set forth in claim 58 wherein said silver plate has been deposited from a silver immersion plating solution comprising a material selected from the group consisting of imidazoles, benzimidazoles, imidazole derivatives, and benzimidazole derivatives.